Ohio, the whole constituting the broadest study on the "Great River Age" that has been made. He considers the great lakes as largely valleys of subaërial erosion, traversed by the Grand River which he has worked out. The Ancient buried course of the Niagara, the author considers as interglacial, being formed and closed subsequent to the closing of the Dundas Valley. Of course, all this presupposes the action to have been going on when the continent was six hundred feet higher, and from the pot-holes in the New York Harbor, we know it to have had an altitude of at least 900 above the present elevation. To perfect the work there remains the discovery of the outlet of Lake Ontario, which was not by the Mohawk, as in its valley near Little Falls, it passes over hard rock. Yet Prof. Spencer insinuates, in this paper, that he is on the track of this discovery also, and that the study will be pursued during the coming summer. We wish the author every success, and if this ancient outlet be discovered, certainly he will have added much to his already most important discovery, and will fairly be considered as one of the founders of this new scientific development.

It must be further stated that the author does not consider all the ancient buried rivers now running southward, but formerly flowing northward, as having in any way been derived from glacier action, and more recently than the paper, which we are reviewing, a notice by him was read before the American Philosophical Society showing that the Monongahela flowed directly northward by the upper Ohio, Beaver, Mahoning and Grand Rivers of Ohio (the last three reversed in Preglacial times) to Lake Erie, thus adding another important tributary to the Erie Basin and further changing the physical features of the Continent.

This paper, which is the first preliminary notice of his work on the Great River Age, will do much to draw attention to the interesting subject which is destined to have an equal place with Glacial Geology, with the extreme views of which it will be found to conflict more or less.

ON M. C. FAURE'S SECONDARY BATTERY.

The researches of M. Gaston Planté on the polarization of voltameters led to his invention of the secondary cell, composed of two strips of lead immersed in acidulated water. These cells accumulate and, so to speak, store up the electricity passed into them from some outside generator. When the two electrodes are connected with any source of electricity the surfaces of the two strips of lead undergo certain modifications. Thus, the positive pole retains oxygen and becomes covered with a thin coating of peroxide of lead, while the negative pole becomes reduced to a clean metallic state.

Now, if the secondary cell is separated from the primary one, we have a veritable voltaic battery, for the symmetry of the poles is upset, and one is ready to give up oxygen and the other eager to receive it. When the poles are connected, an intense electric current is obtained, but it is of short duration. Such a cell, having half a square metre of surface, can store up enough electricity to keep a platinum wire 1 millim. in diameter and 8 centims. long, red-hot for ten minutes. M. Planté has succeeded in increasing the duration of the current by alternately charging and discharging the cell, so as alternately to form layers of reduced metal and peroxide of lead on the surface of the strip. It was seen that this cell would afford an excellent means for the conveyance of electricity from place to place, the great drawback, however, being that the storing capacity was not sufficient as compared with the weight and size of the cell. This difficulty has now been overcome by M. Faure: the cell as he has improved it is made in the following manner:

The two strips of lead are separately covered with minium or some other insoluble oxide of lead, then covered with an envelope of felt, firmly attached by rivets of lead. These two electrodes are then placed near each other in water acidulated with sulphuric acid, as in the Planté cell. The cell is then attached to a battery so as to allow a current of electricity to pass through it, and the minium is thereby reduced to metallic spongy lead on the negative pole, and oxidised to peroxide of lead on the positive pole; when the cell is discharged the reduced lead becomes oxidised, and the peroxide of lead is reduced until the cell becomes inert.

The improvement consists, as will be seen, in substituting for strips of lead masses of spongy lead; for, in the Planté cell, the action is restricted to the surface, while in Faure's modification the action is almost unlimited. A battery composed of Faure's cells, and weighing 150 lbs., is capable of storing up a quantity of electricity equivalent to one-horse power during one hour, and calculations based on facts on thermal chemistry shows that this weight could be greatly decreased. A battery of 24 cells, each weighing 14 lbs., will keep a strip of platinum ⅝ths of an inch wide, 1-32nd of an inch thick, and 9 feet 10 ins. long, red hot for a long time.

The loss resulting from the charging and discharging of this battery is not great: for example, if a certain quantity of energy is expended in charging the cells, 80 per cent of that energy can be reproduced by the electricity resulting from the discharge of the cells; moreover, the battery can be carried from one place to another without injury. A battery was lately charged in Paris, then taken to Brussels, where it was used the next day without recharging. The cost is also said to be very low. A quantity of electricity can be produced, stored. and delivered at any distance within 3 miles of the works for 1½d. Therefore these batteries may become useful in producing the electric light in private houses. A 1250 horse-power engine, working dynamo machines giving a continuous current, will in one hour produce 1000 horse-power of effective electricity, that is to say 80 per cent of the initial force. The cost of the machines, establishment, and construction will not be more than £40,000, and the quantity of coal burnt will be 2 lbs. per hour per effective horse-power, which will cost (say) ½d. The apparatus necessary to store up the force of 1000 horses for twenty-four hours will cost £48,000, and will weigh 1500 tons. This price and these weights may become much less after a time. The expense for wages and repairs will be less than ¼d. per hour per horse-power, which would be £24 per day. or £8800 a year; thus the total cost of one-horse-power for an hour stored up at the works is ¾d. Allowing that the carriage will cost as much as the production and storing, we have what is stated above, viz., that the total cost within 3 miles of the works is 1½d. per horse-power per hour. This quantity of electricity will produce a light, according to the amount of division, equivalent to from 5 to 30 gas burners, which is much cheaper than gas.—*Chemical News.*

MICROSCOPY.

We offer the following notes culled from the pages of the *Journal of the Royal Microscopic Society*:—

A singular species of Ncarus is described by A. D. Michael, found by him at Land's End, England. It belongs to the genus *Dermaleichus* (Koch) *Analges* (Nitsch) but does not fit into any of the five genera, or sub-genera, into which Robins has divided the group. The leading feature in this curious creature was that the male had the left leg of the second pair conspicuously larger than its fellow on the right side, had a totally different tarsus, and supported by a different and more powerful epimeral and sternal arrangement. This deformity makes this species entirely different to any other *Ncarus*.

Haustein has observed in the central cells of *chara*, chlorophyll-bodies containing starch which could not be regarded as the product of assimilation. C. Dehnecke has now investigated a number of similar instances, in which the starch contained within the chlorophyll-grains appears not to serve the purpose of immediate assimilation, but to be stored up as a reserve material.

A new stereoscopic eye piece has been arranged by Professor E. Abbe. The special feature of this instrument

is the ingenious arrangement whereby, by simply turning the caps with the diaphragms, orthoscopic or pseudoscopic effect can be produced instantly at pleasure. It is more particularly available for tubes of short length for which the Wenham prism is inapplicable.

Powell and Leland have completed a new 1-12 having two front lenses. The maximum numerical aperture is 1.43 (= 140° in crown glass of mean index 1.525), obtained by a front lens several degrees greater than a hemisphere, mounted on a plate of glass .003 inch in thickness, which is itself mounted in the usual metal work by the zone projecting beyond the circumference of the lens. With this front lens the focal distance from the exposed surface of the plate on which the lens is mounted is .007 inches. A second front, nearly a hemisphere, is mounted in the usual way by a burred edge of metal covering the extreme margin of the lens. This front gives a numerical aperture of 1.28 (= 115° in glass) and the focal distance is then 0.16 inch. The third front provides a numerical aperture of 1.0 (=82° in glass, as nearly as possible), and the working distance is then .024 inch—probably the greatest working distance hitherto obtained with a 1-12 of that aperture.

Dr. Reidel, an assistant to Professor Abbe, has found two new fluids suitable for homogeneous objectives. The first is a solution of Gum Damar dissolved in hot oil of cedar-wood. The oil which is obtained in Germany has a refractive index of 1.51 *only*, but by the Damar this can be raised to 1.54. If *carefully distilled* it becomes sufficiently pale and loses its stickiness. The other medium is a solution of *iodate of zinc* in Price's ordinary glycerine (n = 1.46). This salt is *very* soluble in glycerine, and a refractive index of 1.56 or more can be obtained, and therefore there is no difficulty in making a solution of 1.52 which is the standard index at 18° cent. Professor Abbe has furnished Mr. Zeiss with a new formula for homogeneous $\frac{1}{8}$, this having a numerical aperture of 1.40 and adjusted for the new fluids.

Mr. T. Charters White, R. M. S., calls for some re-agent suitable for mounting insects; carbolic acid renders the chitinous envelope transparent, but has the same effect on the internal organs also. Dr. Mathews also objected to carbolic acid, as it caused the abdomen of insects thus mounted to collapse. Those who have had some experience in making preparations for insect anatomy will perhaps have suggestions to make.

We lately called attention to infusoria found in cases of epidemic catarrh, called *Asthematos ciliaris*. Dr. Leidy doubted the character of this form and suggested its being a *ciliated epithelium*. Dr. Carter now maintains that it is correct to call it an infusorium, because by culture in mucus outside the body, they increase in number, and they are found in morbid secretions of the conjunctiva where no ciliated epithelia exist—moreover, those remedies only cure the disease which kill the *Asthematos*.

THE STEREORACHYS.

A new specimen of this gigantic and marvellous reptile from the permian schists of Igornay (Saône and Loire) has been presented by M. Gaudry, who gives an exceedingly interesting description of it. Among the results formulated by the learned paleontologist, one of the most striking is the continuity of life of the primary epoch to the secondary one. We are tending more and more to the idea of the slow modifications of terrestrial conditions, and are therefore receiving more and more from the gratuitous supposition of the revolutions of the globe.

To the Editor of "SCIENCE:"

DEAR SIR:—In the last number of your valuable periodical, at the close of a review of Professor Packard's work on the "Brain of the Locust," the writer states: "In view of the loudly trumpeted theory recently revived by Dr. J. J. Mason, after having repeatedly received the *coup de grâce* at the hands of Stieda, Meynert and others that large cells are motor, it is interesting to note that those of the optic ganglion in the locust are among the largest cells in its nervous system."

This is a complete error, so far as I am concerned. No such claim has ever been made by me in any form, by hint, inference or otherwise. In my last paper on the dimensions of nuclei there appears this sentence: "At the same time it may be true that all large cells connect with motor filaments. The sentence which immediately precedes this one clearly proves that I refer here exclusively to the spinal cord of turtles. This is reviving no theory. Yours truly,

JOHN J. MASON.

NEWPORT, *June* 13, 1881.

SUN SPOTS.

The following record of observations, made by Mr. D. P. Todd, Assistant, has been forwarded by Prof. S. Newcomb, U. S. Navy, Superintendent Nautical Almanac Office, Washington, D. C., to Gen. H. B. Hazen.

DATE, APRIL, 1881.	NUMBER OF NEW		DISAPPEARED BY SOLAR ROTATION.		REAPPEARED BY SOLAR ROTATION.		TOTAL NUMBER VISIBLE.		REMARKS.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	
2, 9 a.m.....	1	5	0	0	1	1	3	10	
3, 10 a.m.....	2	11	1	1	1	2	4	†20	Few faculæ.
5, 8 a.m.....	0	0	0	0	0	0	4	†20	Faculæ.
6, 7 a.m.....	1	3	0	0	1	3	5	†18	Faculæ.
7, 7 a.m.....	1	3	1	5	1	3	4	14	Faculæ.
10, 10 a.m.....	0	3	..	..	0	3	3	8	Faculæ.
11, 8 a.m.....	0	0	0	0	0	0	2	7	Faculæ.
14, 8 a.m.....	2	15	..	..	..	..	3	†20	Faculæ.
15, 8 a.m.....	0	†20	0	0	0	0	3	†40	Faculæ. Many of the spots small.
17, 7 a.m.....	4	15	0	0	3	10	7	†55	
21, 9 a.m.....	0	†60	..	..	..	..	6	†115	Faculæ. Many of the spots small.
23, 7 a.m.....	0	0	1	†20	0	0	4	†85	Faculæ. Many of the spots small. Spots probably disappeared by solar rotation.
24, 9 a.m.....	0	0	1	10	0	0	3	†60	Faculæ. Many of the spots small.
26, 8 a.m.....	1	5	0	10	0	0	4	†55	
28, 7 a.m.....	0	0	2	†45	0	0	3	10	Faculæ.
8 a.m.....	0	0	0	0	0	0	3	10	
30, 9 a.m.....	1	4	2	9	1	4	2	5	Faculæ.

† Approximated.